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JPRS-ESA-84-026

20 July 1984

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East Europe Report

SCIENCE & TECHNOLOGY

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20 July 1984

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SCIENCE & TECHNOLOGY
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ESTABLISHMENT OF NATIONAL COMPUTER NETWORK URGED

Sofia RABOTNICHESKO DELO in Bulgarian 12 Jun 84 p 2

[Article by engineer Varteks Karalyan, director of prospective development and scientific services at the Ministry of Communications: "Production of... Communication Services: What Necessitates the Establishment of a National Network for Data Transfer?"]

[Text] At a moment when electronic computing equipment and microprocessors have broadly entered all branches of business and economic life, it is necessary to have automated control over a number of processes in order to solve tasks on a large scale. The use of personal computers, information processing and storage system/word processing machines, a whole range of electronic devices as the components of office equipment, has begun to take effect in a massive way.

All this has made it necessary to have a new communication network which will permit information exchange between the already established electronic computing centers and electronic devices within the country and on an international scale as well.

The efforts of the Ministry of Communications during the last two 5-year plans have been directed toward overcoming the lag in communications so that it does not interfere with the normal course of administrative and economic activity in the country, as well as satisfying the needs of the populace for various communications services.

One of the most important tasks facing communications is the establishment of a national network for data transfer. There are over 60 service networks at the present time around the world, some of which include subscribers from various countries and continents. The data transfer network is an important communications system. It uses basically new communications devices.

The availability of a sufficiently wide range of hardware and software devices, in our country and the member nations of CEMA, for building contemporary information and teleprocessing systems, as well as machines and complexes, gave a boost to the rapid implementation of automated control systems and information systems of various sizes and designs in our country. Hundreds of local information computing centers are operating in our country alone.

With the sharp increase in users of these new systems, the need for building a specialized data transfer network has become acutely evident. At the present time, the Ministry of Communications has made its channels available mostly to administrations which need information exchange right now. This is quite an expensive and inefficient resolution. Due to teleprocessing system peculiarities, one channel is used for 15 to 70 minutes daily, whereas the channel could be used for 24 hours each day. Consequently, the channel is out of use for almost 23 hours every day. For each new user, the Ministry of Communications has to set aside more and more data transfer channels, which are designed for telephone subscribers. In order to satisfy the need for quality information transfer between hundreds and thousands of computers and terminals, the Ministry of Communications is already building a national network for data transfer, which will be used by everyone. Its main part will be the BULPAK network, which will utilize entirely electronic digital communication systems on the so-called "package principle."

Our network is designed to allow access for data transfer to foreign networks, as well as different scientific and technical information data bases. The national network will provide service with immeasurably higher quality, together with over 15 kinds of new services. The BULPAK network will provide the following:

- connecting computers and terminals in the country into a uniform computing system;
- increasing the quality of transfer;
- an 80 percent increase in the effective use of communications channels;
- an annual savings of several dozen million leva over the available individual communications channels;
- connections with foreign networks for general use; in addition, our national network will "transfer" a significant part of the foreign traffic to Europe and the socialist countries;
- through the use of a new generation of public telephones operating with telephone credit cards, rural, interrural, and international calls will be permitted as calls charged to the home telephone.

The BANKOMAT system for monetary transactions by holders of bank accounts is to be implemented and will make it possible to use the network for withdrawing sums from one's own account, in various towns.

Our national network for data transfer will also be the basis for fulfilling the obligations of the Ministry of Communications for establishing a unified functional system, which were set forth in the "Basic Directions for Improving the Administrative and Legal Services to the Populace of the Bulgarian People's Republic."

The programs for developing electronization and automation will truly transform the communications industry into...an industry for the production of services.

MICROELECTRONICS APPLICATIONS AT 1984 LEIPZIG SPRING FAIR

East Berlin RECHENTECHNIK-DATENVERARBEITUNG in German Vol 21 No 5, May 84
pp 24-30

{Text] In its 1984 fair presentation, the electrical and electronics industry of the GDR is offering a new conception: Under the motto, "Applications of Microelectronics", a large number of sometimes quite different and manifold application solutions was shown in Hall 15. In many cases, these joined together the products of several combines to form one exemplary solution. The common factor here was microelectronics - in the majority of cases based on the K 1520 or K 1600. This design will be met primarily by the visitor to the fair who is searching for solutions involving greater efficiency and it should find many new interested parties and future users of microcomputer technology - trade and marketing organizations should take up such designs in their programs, designs which transcend the boundaries of the combines.

The exhibits at the fair clearly emphasize the application of the computer, supported work station for design and technology (CAD/CAM system) - an area where the efficiency of the national economy can be advanced to a decisive extent. Various manufacturers exhibited solutions which convincingly demonstrated the improved efficiency in the work of the designer and engineer.

The 1984 Spring Fair furthermore made clear that the presented terminals, office computers, and microcomputers constantly open up new application areas to computer technology, with notable results. Among other things, the entry of microelectronics into domestic life is becoming visible: Besides the already familiar chess computer and the TV games, the first models of GDR personal computers are being presented.

The LFM (Leipzig Spring Fair) 1984 leads to the conclusion that microelectronics is continuing its victory march without interruption, that it has reached a considerable level in development and application, and that the future promises still more in upgrading the most various areas of our life and making them more efficient. A few selected examples will be presented below, by means of which the success of the 1984 LFM will be illustrated.

AKT 6454

Already discussed on several occasions, the work station for design and engineering could now be seen in actual application. This CAD/CAM system is intended for computer-supported preparation and production in terms of design engineering and technology (Figure 1).

The main application areas are the computer-supported production of drawings, the planning of machines, systems, the design of variants, the programming of numerically-controlled machine tools, as well as the calculation of individual parts. On this basis, e.g. in collaboration with the machine tool industry of the GDR, an all-round solution for the entire process of design, engineering, and production is being offered for the parts assortment of rotationally symmetric single parts. The main points of application are computer supported drafting and detailing of designs, the production of drawings, the planning of machines and systems, as well as the design of variants. Furthermore, it calculates parts and subassemblies, programs NC machines, and works out engineering documents. Examples of its use in the automobile industry, in the machine tool industry, or in computer supported production organization in the shoe industry demonstrated the universal applicability of this system.

Because of the high processing power which derives from graphic work, the K 1630 microcomputer with an arithmetic processor and with a main memory of at least 128 Kbytes is used as the control core. Components of the A 6454 furthermore include not only the typical standard peripherals, but the application-related graphic peripherals with a grid display unit, a plotter, and a high-resolution digitizer, graphic and geometric basic software, as well as the DVS 1600 data management system.

Precision Digitizer A 5601

The autonomous unit for digitizing geometric plots is based on the K 1520 microcomputer system (Figure 2). It is used in microelectronics (design of printed circuit boards), in the planning of buildings, in the clothing industry for optimizing the cut, in traffic for optimizing transportation to deal with traffic networks - to mention only a few examples.

Graphic plots are converted into digital information by scanning and are then processed further. With the circuit board design that was demonstrated at the fair, for example, pictorial conductor designs were converted into control strips for light signal and processing machines. By means of the cross-hair scanning head, conductor strips, soldering points, and the like are sensed and are transmitted to the microcomputer. The microcomputer is again equipped with a packet of basic graphic software. Besides manifold application possibilities, the advantages of the A 5601 lie in its high precision (an example includes printed circuit boards), in the reduction of the frequency of errors, and in the saving of working time during the acquisition process.

Drawing Board Oriented Design Work Station (ROK) A 5510

The basic computer for this is the A 5120 office computer. The capabilities of graphic data processing are created by connecting high-resolution digitizing units and graphic output units (serial printer with single-needle control and plotter). The application capabilities are very broad. Among other things, routine work during drawing and digitizing is made more efficient by the use of externally stored standard elements in digitized form and by manipulation with already existing drawing structures. Besides the office computer, the hardware components of the ROK comprise a film storage unit, a monitor, and a keyboard, a digitizer with a carriage drawing machine, as well as a serial printer.

Engineering Work Station A 5130

This work station is primarily used for special engineering work such as the entering, preprocessing, and modification of primary data, as well as for programming NC machine tools.

Picture and Language Processing

Picture Processing

The interactive digital picture processing systems A 6471-A 6473 (Figure 3) are used to process picture-like information with high operating speed. They facilitate the direct visualization of intermediate results and final results of the processing process on color and black/white monitors. In their different variants, they represent a combination of modern computer systems, special processors, and user-oriented software. Application areas include, among other things, the instant evaluation and interpretation of multi-spectral, meteorological, and cartographic pictures of the earth, which are obtained with recording systems in aircraft, satellites, and space vehicles, an interactive and automatic analysis of thermographic, sonographic, and tomographic pictures as well as the processing of microscope pictures, automatic quality control of materials, the monitoring of processes with a movable object, or a representation of process sequences, and control of industrial installations.

Voice Communication

With the use of natural language for man-machine communication, completely new possibilities open up in contrast to the conventional input and output of information (Figure 6). The advantages of voice communication are e.g. the spatial propagation of sound. This makes possible high mobility on the part of the user at the work station. The forcefulness of acoustic information causes high attention on the part of the user. The fact that the eyes and the hands are not used, makes possible manual activities even while information is being exchanged. Existing communication facilities such as public or business telephone networks can be utilized. Information exchange is still possible even with poor illumination or other working conditions that are unsuitable for traditional means of communication. The great similarity with inter-human communication facilitates the use of untrained personnel.

Application areas for voice communication units are, in particular, graphical work stations, CAD systems, X-ray and aerial photograph evaluations, microscopy work stations, quality control, sorting work stations, operational data entry in depots and in commerce, the programming and control of NC machines and industrial robots, control tasks and operator guidance in measurement and switching installations, handicapped work stations, as well as telecommunications.

The A 6422 Data and Information System

The A 6422 data and information system was developed for the needs of operational data acquisition and processing (Figure 4). Through a multiplicity of terminals, it permits the entry, processing, and output of data, manually through a keyboard, semiautomatically through ID cards, and automatically through a digital I/O interface. Depending on the device configuration and software packet, different complexes can be implemented for the most various areas and industrial branches, such as production monitoring and control systems, inventory maintenance systems, personnel data verification systems, and finally also data collection systems. Besides problem-oriented program packets, hardware is available for this, including the K 1630 microcomputer, various terminals, and the K 8523 multiplexer.

An effective technology for the construction of special application solutions is involved in the use of the modular data processing and evaluation system MODAS. Besides better utilization of hardware, planning effort is considerably reduced for operation-specific solutions.

Upgraded K 1600 with Associated Processor AZP K 2064

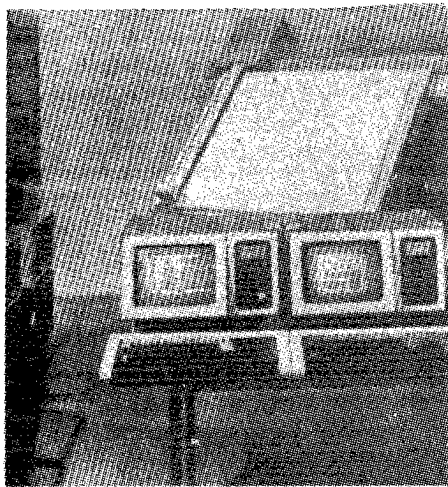
The AZP K 2064 is a unit for the microcomputer system K 1600, which achieves content-addressed and direct access to a data area from 64 Kb up to 1 Mb. This data area is reached through a main storage window. The content-addressed access takes place by means of a driver through QIO executive calls or with I/O register addressing. In direct access, the 4 K to 32 Kword window is addressed in the K 1600 main storage mode. The storage region of the AZP which currently belongs to the window is set by a side or card change via driver calls.

The AZP K 2064 speeds up special processing tasks with a high proportion of disk accesses, by a factor of 1.5 to 5, and increases the reliability of the overall system by reducing disk accesses. Application areas are information systems, parts list problems, data base systems, systems for supporting design processes, and production organization (AKT applications).

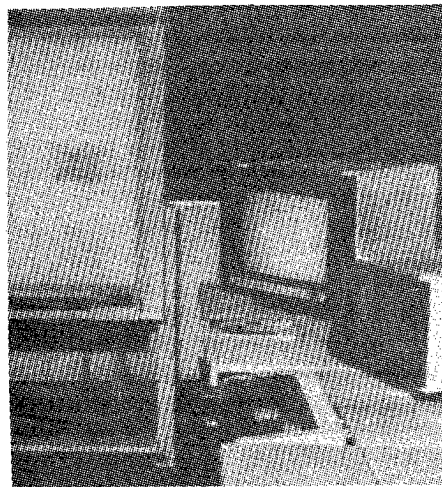
The Z 9001 Personal Computer - An Electronic Consumer Article with a High Technical Use Value

The Robotron personal computer Z 9001 (Figures 5 and 7) offers meaningful leisure time activity with demanding game variants. Besides these use possibilities, individual work and information memory processes, as well as teaching and learning possibilities, can be made more efficient. Furthermore,

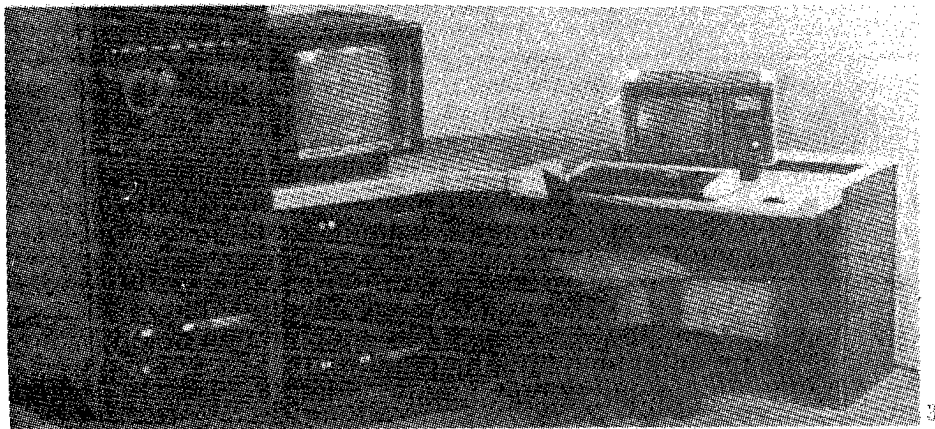
completely novel methods of the control of personal computers and hobby units are opened up with the Z9001. With its technical capabilities, the personal computer also is suggested for the specific needs of users in the area of education, in medical facilities, as well as in medium and small businesses. The manufacturer's software is primarily designed for programs concerning instruction and teaching, hobbies, the domestic area, professions, and computer games.



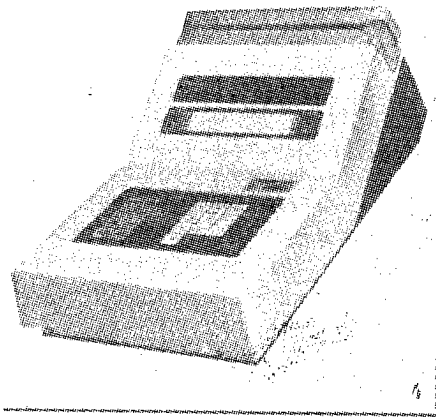
AKT 6464 work station for design and engineering, with the 6454 computer and the K8911 and K8917 terminal



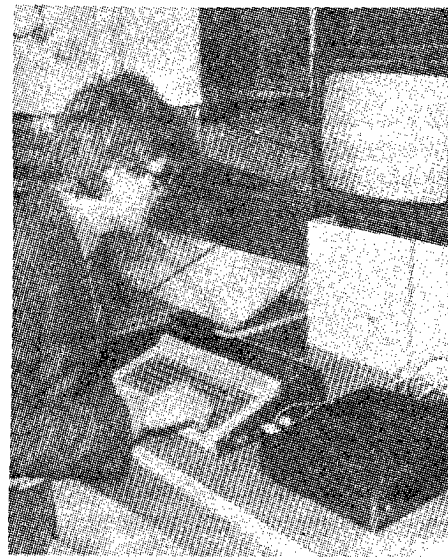
Precision digitizing unit A 5601 with DG 20 and with the K 7226 color display



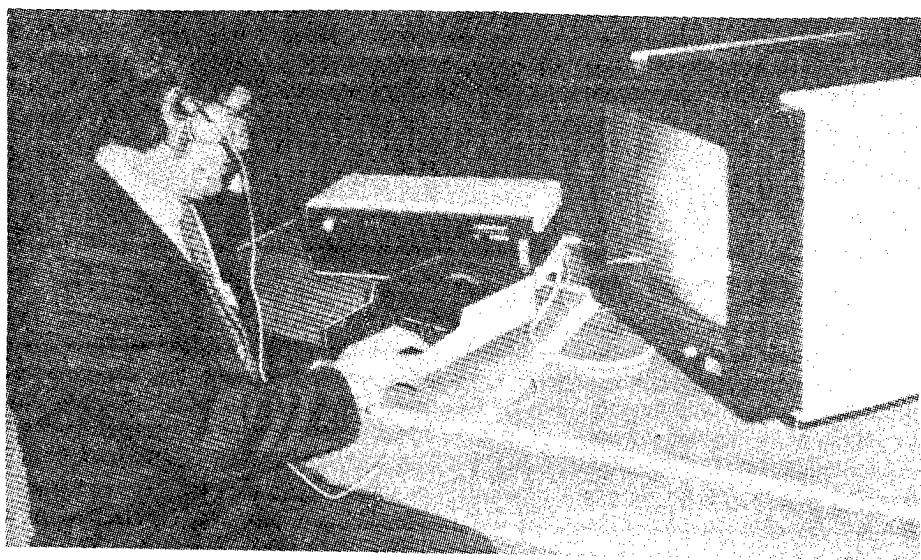
A 6472 picture processing system



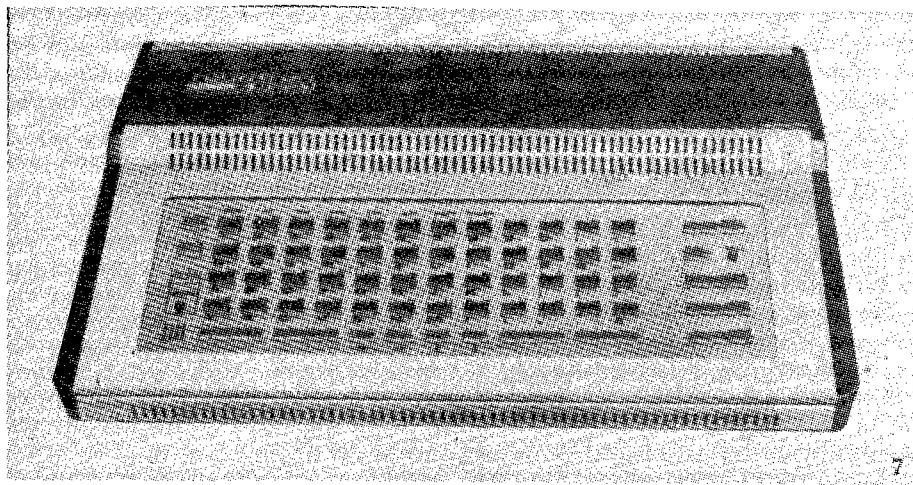
A 6422 data and information system



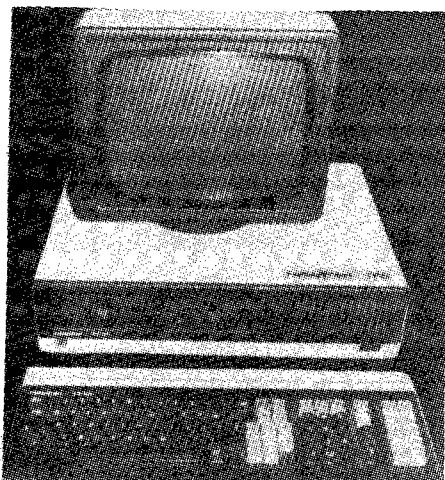
5
Z 9001 with Robotron TV unit (display screen) and RFT cassette unit as external memory



Man-machine communication in natural language



Personal computer Z 9001

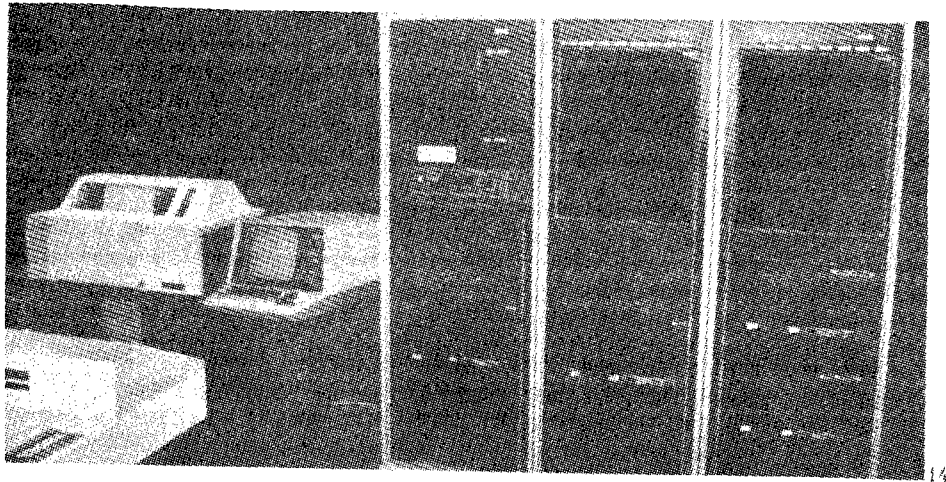


The Robotron 1715 invoicing and accounting machine with minifilm memory

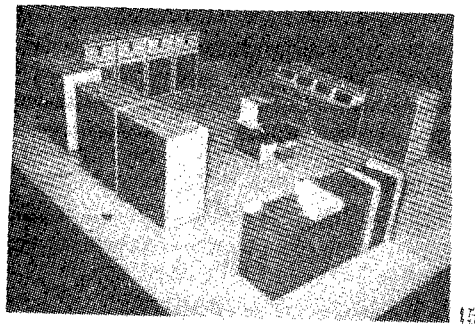
Electronic invoicing and accounting machine - Robotron 1715

This electronic invoicing and accounting machine rests on a basic conception which represents an integration of hardware and software both for the user and also for marketing (Figure 8). The technical application conditions correspond to the requirements of decentralized, document-oriented and same-day problem solutions, especially for application areas of invoicing and accounting in all areas of the economy. Because the unit has variable equipment and because the software is directed to specific applications, the invoicing and accounting machine Robotron 1715 also does justice to other individual user needs.

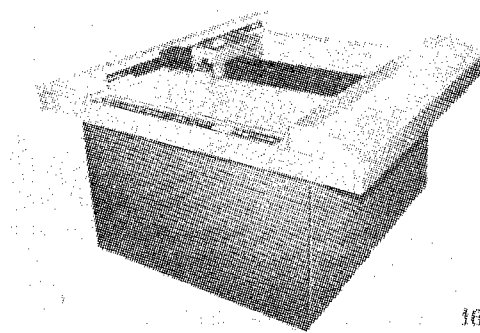
[Photos 9 through 13 not included]



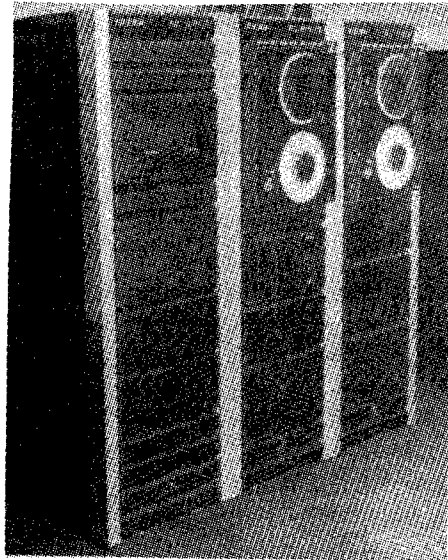
CM 52-11 with printer from Videoton



Model of an EC 1036



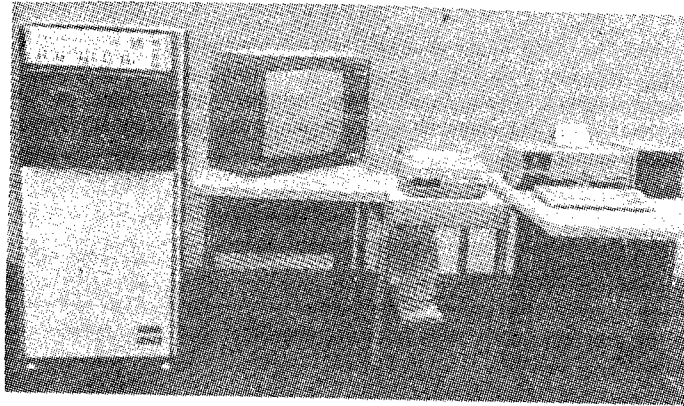
The Digigraf 1208 A in off-line operation



An innovation from Videoton: EC 1011/C

Engineering Device Foundations of voice input and output technology

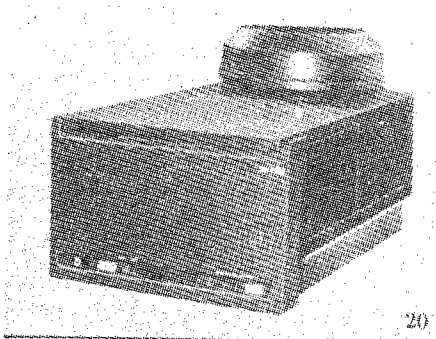
ESE K 7821	Single-board voice detector as OEM module based on the U 880 CPU (analogous to Z 80)
SEG K 7823	Voice recognition unit as desk-top variant on a K 1520 basis
BAS K 7822.01	Operating, display, and memory unit for voice recognition K 7821 and K 7823
KAM K 7801	Short message module, single-board synthesizer, which is equipped with a memory for 4s-language, a D/A conversion device, and a power amplifier
KAG K 7802.01	Short message unit with external text addressing
KAG K 7802.02	Short message unit with internal addressing module
UZG K 7802.03	Clock timer announcement unit
KAG K 7803	Short message unit with multiple use



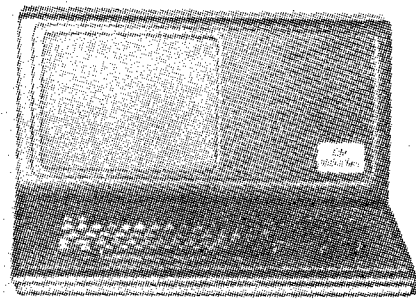
SLK 80 office computer



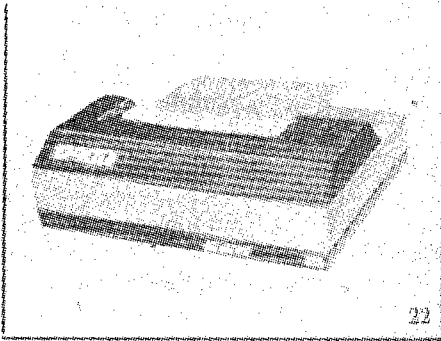
RTDS microcomputer development system



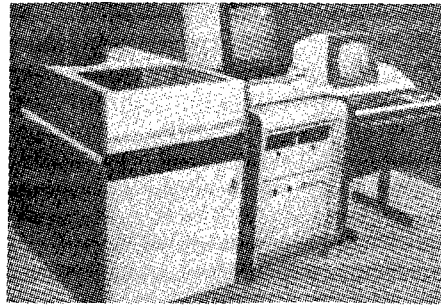
80 MB disk memory from ISOT: CM 5412



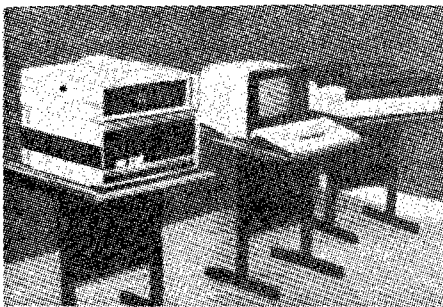
CM 1604.M1 display screen terminal



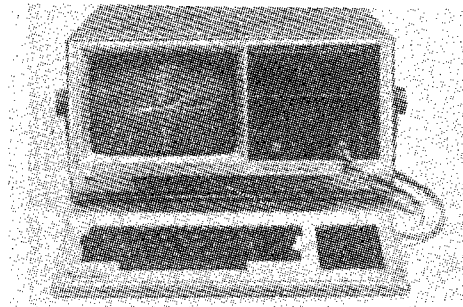
Matrix printer from MERA-BLONIE:
D 100



Special configuration of the
Independent



Felix m 118



Process controller PUC from
Rohde and Schwarz



Process control system Teleperm
M from Siemens

SECOP 3004 R - the standard paper copier with reduction

This copying unit is being presented for the first time (Figure 12). It comes from the Berlin Secura Works in the microelectronics combine. It is distinguished by a series of advantages: It copies not only on a scale of 1:1, but also reduces by one stage. In one minute, the SECOP 3004 R produces 16 copies in the A4 format from one original - even with reduction. A fixed original insert permits the copying of individual pages, EDP printouts, journals, and books. Two paper cassettes, which are selected by a pushbutton, take care of automatic paper feed. Through a single-page system, one can copy on special material such as offset or transparent sheets, and self-adhesive labels. The diagnostic system indicates the current operating status to the operator, and points out possible disturbances in the unit.

ESER (Uniform Electronic Data Processing System) - 3 System from the USSR

At the 1983 Leipzig Spring Fair, the Electronorgtechnika presented the model EC 1065. This year, the model EC 1036 could be seen (Figure 15). This is the first computer system of ESER-3. The instruction set of the processor comprises 220 instructions, its operating speed is 400,000 instructions per second. The size of main storage is optionally 2048 or 4096 Kbytes. The system has four block multiplex channels and one byte multiplex channel; the current consumption by the processor and the operator console is about 11.8 KVA. Export in the GDR is intended.

A visible example for the possibilities of socialist integration was the exhibited CM 1300, equipped with two terminals from Videoton and the Robotron 1156 printer. As a two-machine complex, the system is suited for controlling technological processes. The exhibitors received a gold medal for this product.

The exhibited CM 1600, with a main storage capacity of 256 Kbytes, also belongs to the SKR (Minicomputer System) series. Programs can be written in FORTRAN, BASIC, PASCAL or COBOL. Here, a copious instruction set is available, including 46 instructions for floating point arithmetic alone. The processing rate of the system is essentially determined by the two-processor system. The main storage belonging to this system has two inputs and thus makes possible the parallel operation of both processors.

The exhibited microcomputer system NZ-80-20 has already been described in detail in *Rechnetechnik/datenverarbeitung*, Issue 8/83, 4. US.

New Computing and Drawing Technology from the CSSR

The Czech foreign trade enterprise KOVO had two firsts simultaneously in the area of computer technology: First, the CM 52-11 computer system, and secondly the 1208 A Digigraf.

With a new processor, the CM 52-11 (Figure 14) is supposed to have 30 percent higher power as compared to the CM 4-20. The main reason for this is that the speed for register/register operations is about 2 800 000 instructions per second. It should also be of interest that, beginning in 1985, it will be possible to expand the main storage capacity to 4 MBytes.

All units of the CM 4-20 can be connected to the CM 52-11. The DOS RV V2 is used as the operating system. Already by the end of this year, the first computer of this new type will be delivered in the GDR.

With the Digigraf 1208 A (Figure 16), the A stands for a higher character rate and less energy consumption. When idling, it requires 600 W, otherwise 800 W. Furthermore, in comparison to its predecessor model, the DGF 1208, a simplified manual control is possible. This means manual operation can be performed without intervention in the microprogramming.

Hungarian Peoples' Republic with its New ESER Computer

The further development of the EC 1011 system certainly aroused much interest at the stand of the Videoton AG. This system is also utilized in the GDR. The follow-on model EC 1011/C (Figure 17) offers primarily an expanded performance spectrum, based on the new system structure. Here, the instruction set to the EC 1011 is compatible - with significantly shorter execution time. Further features are: autonomously operating, microprocessor-controlled peripheral connection units, I/O bus for the peripheral connection units with 2.3 Mbytes/s remote loading and remote diagnostic possibilities, etc. As a basic innovation, the EC 1011/C has a cache memory (semiconductor high speed memory) with 16 Kbytes and 150 ns cycle time, so that the microprogrammed control unit no longer needs to access the main memory directly. The performance increases, however, are to be regarded as an integration of hardware and software: Thus, a data base/data communication system (DB/DC) as well as a network system (VTCS), in combination with operating systems, subsystems, and user systems, round out the picture of the new installation.

The second novelty on the Videoton stand is also a further development of technology that is already known in the GDR: The office computer SLK-80 (Figure 18) of the BRG Works is the successor of the data entry and pre-processing system SLK-4. On the basis of its configurations, it offers manifold use possibilities, for example the transmission of process data by means of an EK 9006B converter on one half inch magnetic tape.

Other exhibits were the minicomputer system VT 20A, the display system VDN 52576/52578 as well as the floppy disk drive MF 6400 and MF 1800 (minifloppy) from the MOM works.

80 Mbyte memory from Bulgaria

As already in previous years, the emphasis at ISOTIMPEX at this year's LFM also fell on the presentation of memory technology. As a further development of the interchangeable disk memories CM 5400, which has already been used for some time in the SKR, the CM 5412 version was exhibited (Figure 20). On the

three working disks of the ISOT 002C stack, it now offers 80 Mbytes of unformatted capacity with an average access time of 45 ms. Mass production is supposed to start even this year. Besides further memory units - for example the one half inch magnetic tape drives for the SKI - ISOT-IMPEX exhibited a display screen terminal station (EC 8566) with its own processor, to whose main unit up to eight terminals (video screen or printer) can be connected. As an innovation, the video terminal TM 1604.M1 was presented (Figure 21). With an 8-bit processor, it can be used both as operator terminal and also in autonomous operation. Other exhibits were a converter MBG printer (EC 7090), and the microcomputer system in the CAMAC standard ISOT 0260.

Manifold Computer Technology from Poland

The Peoples' Republic of Poland this year was again represented with several computer devices.

The Polish CM-4A is equipped with a 12-bit processor, the Elektronika 100-25; it was especially developed for tasks in research and in college education. For this purpose, a special coupling unit and a container system was offered for the devices in the CAMAC standard.

A powerful microcomputer development system is the RTDS-8 (Figure 19). Besides program development and testing, it makes possible the generation of system programs and integration of device systems and system documentation by means of in-circuit emulation. The RTDS-8 for this purpose has not only a basic microcomputer but a universal 8-bit microprocessor emulator.

Other exhibits were the matrix printers D-180 and D-200 (see rd 7/83), the small D-100, which was shown for the first time in the GDR (Figure 22), and the further development of the PK-1, the tape cassette unit PK-3.

CAD Applications from Romania

Relatively many exhibits were offered at the Romanian fair stand. But here we can discuss only two of these. The CAD software PIX was demonstrated on a graphic display diagram 2020. The configuration was assembled from modules of the Independent (Figure 23). An example of circuit board design was presented. The software packet CADIX for designing mechanical parts is also included in the offering.

The FELIX m-118 was presented as a new computer that supposedly is already being used in the GDR. It has a main storage capacity of 64 to 128 Kbytes (Figure 24). The configuration consisted of a graphics display with a menu section, an alphanumeric display, two floppy disk units each with 64 Kbytes storage capacity, as well as a Robotron 1152 printer. The computer can be programmed in FORTRAN, COBOL, and PASCAL.

Siemens with Automation Systems

Various control systems for automation technology as well as programming means were exhibited by the FRG Electrical/Electronics Conglomerate, at its traditional stand in Hall 15. By way of selection from its product spectrum, one can mention the mini-control unit Simatic S5-101R and the small and light display-screen programming unit PG 665R. With its flip-up function keyboard and with its 23 cm display screen, it offers generous programming. The operating system is interchangeable with EPROM cassettes that are plugged in at the front. The process guidance systems, Teleperm show a picture.

Process Controller by Rohde and Schwarz

The West Berlin Trade GmbH exhibited a series of computer-supported measuring stations, among which the process controller PUC will be presented (Figure 25). The HF-shielded unit is especially designed for measuring technology and process control. The computing speed was doubled compared to its predecessor model (CPU cycle 2 MHz). Thus, the PUC now belongs among the fast 8-bit computers. The PUC can simultaneously control 14 different commercial units with an IEC bus connection. Furthermore, it offers the capability of bus control through individual instructions, which also makes it possible to connect non-standard units. Its high data transmission rate of 50 Kbytes/s for read and 70 Kbytes/s for output permits efficient operation of fast measuring units, where large quantities of data must be processed. The memory area of the process controller comprises 64 Kbytes. Of these, 32 Kbytes are available to the user as RAM memory space.

The US-American company Hewlett Packard can in the meantime look back to about 10 years of trade relations with the GDR and for many years has exhibited in Leipzig. It was represented with its personal computer HP 86A (Figure 26) [not reproduced]. The modular desk-top computer system with its 8-bit processor and 64 Kbyte RAM can be expanded by inserting 128 Kbyte modules (= HP 86B) up to 64 Kbyte working memory. Added to this is a powerful set of peripherals, such as a graphics-capable matrix printer (160 characters per second), a microfloppy station (two 3 1/2" floppy disks, each with 270 Kbytes), and two color plotters for the DIN A4 format.

Rank Xerox likewise has been represented for years at the Leipzig Fair with its copying technology and minicomputers. In 1983, it introduced for the first time its Number 10 series. From this, they presented the largest model, the Xerox 1075. The device copies up to a format of 216 x 356 mm at a rate of 70 copies per minute and offers numerous functions for increasing convenience.

The EPSON Conglomerate exhibited its product spectrum in Leipzig for the second time in 1984. The HX-20 computer was presented (Figure 27) [not reproduced]. It has available a 32 Kbyte CMOS ROM and a 16 Kbyte CMOS RAM. If one includes an external memory expansion, it can be upgraded to 72 Kbytes ROM and 32 Kbytes RAM. The HX-20 contains a microtape cassette and a printer.

A series of units can be connected, for instance an acoustic coupler (for data transmission by telephone), a floppy disk unit, and a printer.

AUTOMATED EQUIPMENT AT 1984 LEIPZIG SPRING FAIR

East Berlin DIE WIRTSCHAFT in German 1984 Leipzig Spring Fair Issue pp 71-73,25

[Advertisement by VEB Machine-Tool Construction Combine FRITZ HECKERT, GDR 9030 Karl Marx Stadt, Jagdschaenkenstrasse 17, WMW Export-Import, VEB Foreign Trade Enterprise of the GDR, GDR 1040 Berlin, Chauseestrasse 111/112]

The Machine Tool Combine "FRITZ HECKERT" produces 45 percent of the machine tools produced in the GDR and nearly all materials testing machines.

There has been a worldwide increase in the technological, occupational-hygienic and economic requirements imposed on more and more efficient metal processing. Brought to their lowest common denominator, along the road to full automation, the point is to couple modern machine tools, automation equipment, and materials testing machines more and more closely with industrial electronics and computer technology.

At the Leipzig Spring Fair, in fair halls 5 and 20, the machine tool combine presents an extensive offering with 62 exhibits, among them 17 new and 11 further developments. It is thus reacting to international requirements and more stringent demands on the part of the customers. Processing centers and production cells for easy-to-operate and low-maintenance operation are increasingly expanding the offer.

In adaptation to the processing task, the customer already has available a nearly self-contained delivery program of coordinated construction sizes. These are graded for work pieces with edge lengths up to 400 mm, 500 mm, 630 mm, 800 mm, 1000 mm, up to large-part processing. The technical design takes into account that the proper processing center or the proper production cell must be offered for every size of enterprise, production structure, and processing task.

However, there is also progress in details, as regards new clamping means, accessories, components of lubrication technology, and others. Processing centers and production cells also form the basic machinery for flexible production systems, and for self-contained production sections.

The future-oriented supply offering of the machine tool combine "FRITZ

HECKERT" emphasizes the aspect of operatorless production and thus secures an increase of economy, capacity, flexibility, and quality.

Since the combine was founded in 1970, 45 top products have received gold medals at the Leipzig Fair. The continuous increase of exports to all five continents confirms this quality seal on HECKERT machines.

Our further delivery and performance offering

Console-, Cross-Slide-, Compound-Slide-Table Milling Machines
Universal Tool Milling Machines
Multi-Groove Profile Slab-Milling and Thread-Milling Machines
Groove and Long-Hole Milling Machines
Double Sided Shaft Milling and Centering Machines
Double-Column Milling Machines
Double-Column Planing Machines
Horizontal Drilling and Milling Machines
Single- and Double-Column Coordinate Machines
Column-Type, Box-Column-Type, and Radial Drilling Machines
Horizontal and Vertical Flat Grinding Machines
Double-Column Guideway Grinding Machines
Single-Column Coordinate Grinding Machines
Threaded Grinding Machines
Roll Turning Lathe and Roll Grinding Lathe
Special machines and production lines
Equipment and equipment modules
Industrial robots
Materials testing, vibration, and balancing machines
Lubrication and service units
Cast products
Processing centers
Production systems
Production cells
Industrial installation
Licenses/know-how

Figure Captions

1. Horizontal Processing Center CW 500

For the complex milling and drilling processing of prismatic, box-shaped or plate-shaped work pieces with an edge length of 500 X 500 mm and a weight up to 600kg. Computer-optimized frame subassemblies, plastic-coated guide plates and undergrips, pretensioned hob-screw drives make possible optimum cutting values and precision. Drive power 14kw and a large rpm range from 20-400 rpm for progressive cutting values, optionally 40 or 60 tool storage locations, can be automated to make a production cell.

2. Horizontal Processing Center SABOMATIC 630

Processing center for 4-sided processing of work pieces with 630 X 630 mm edge

length and a work piece weight, including equipment, up to 800kg. Primarily for working processes such as milling, circular milling, drilling, boring, countersinking, rubbing, and thread boring. The storage capacity of the tool magazine is optionally 40 or 60 places.

3. Processing Center CBFK 90/1

For the multi-side processing of plate-shaped and box-shaped work pieces up to 5000kg. The mounting surface of the table is 1000 X 1250 mm. Hydrostatic relief of the turntable (table rotation B-axis. 360 degrees). Further palette storage locations can be added. Automatic change of work pieces in palette design, optionally 40 to 60 tool storage locations.

4. Production Cell FC 400 K

Flexible production equipment for processing box-shaped work pieces up to 400 X 400 X 300 mm in easy-to-operate and low-maintenance operation. Integrated switching turntable 48 X 7.5 degrees for all-around work piece processing. Speed of movement 0-10000 mm/min. Design in compact construction - can be set up without a foundation - shortest startup times.

5. The Production Cell MIKROMAT 9 F

Application area for the complete processing of prismatic work pieces up to 900 X 1400 mm and 300kg weight. Equipped with 60 tool storage places and 7 palette places. Working precision IT 5. Finely graduated range of rpm from 10 to 4400 rpm. Power at the drilling spindle 14 kW.

VEB Machine Tool Combine "7 October" Berlin

The VEB Machine Tool Combine "7 October" Berlin has specialized in the machine tool area to the development and production of production equipment for processing methods, lathe work, grinding, and gear cutting, i.e. machines for the processing of rotationally symmetric work pieces. Its production program includes, among other things, grinding, cutting, and gear cutting machines, special machines, grinding tools, as well as production lines and machine systems. The product spectrum of the combine is constantly being updated by novel and further developments according to market requirements. These new developments correspond to the most recent information from research and development. Among these belong modern control and driving technology based on microelectronics as well as the full utilization of powerful tools and tool equipment.

Enterprises of the Combine

Thirteen enterprises belong to the Machine Tool Combine "7 October" Berlin, among them:

Eight machine tool construction enterprises

One enterprise for the development and production of means to promote

efficiency and special machinery,
One enterprise for development of machine tool castings
One Enterprise for services and
One engineering enterprise.

These thirteen enterprises have 43 territorially separate production areas in nine regions of the GDR.

A High Proportion of Exports

About 55 percent of the parts assortment of the metal processing industry can be processed by machine from the product spectrum of the VEB Machine Tool Combine "7 October" Berlin. These parts primarily include the processing groups of turning, grinding, and gear cutting. The industries involved primarily include the automobile and tractor industry, electric motor and roller bearing industry, and machine construction. In accord with the needs and requirements of the main buyers of the combine's products - about 80 percent of final production are exported - the proportion of machine tools with high working precision has increased progressively during the last five years. These tools are used to accomplish complex technological problem solutions, as well as for the planning, production, and delivery of production lines and machine systems.

The trade assortment comprises about 85 types, which are exported to about 60 countries in all continents. Especially in demand are the gear hobbing and generation grinding machines, internal and external cylindrical grinding machines, facing machines, as well as lathes for chuck and tip parts.

Attractive Machines, Licenses, and Consultation

The offering of the VEB Machine Tool Combine "7 October" Berlin at the Spring Fair again comprises a representative cross section of new and further developments. These include chuck and tip lathe machines, multi-spindle automatic lathes, internal and external cylindrical grinding machines including modern control and driving technology based on micro-electronics, as well as production cells and robot technology. Furthermore, the fair offering includes "machine tool and tool files licenses", i.e. production lines and cells as well as a spectrum of software, patent licenses, know-how, and engineering are offered. The services offered include the transfer of documentation, preparation for production, and extends up to the actual performance of production.

New Developments for Turning, Grinding and Gear Cutting

Among the offering of the combine at the fair, novel developments in the areas of turning, grinding, and gear cutting should be especially emphasized. Thus, the VEB Large Lathe Construction "8 May" Karl-Marx-Stadt, with its production cell FC DFS 2/2 CNC opens up completely new paths in lathe work. This production cell includes the IR 2P portable robots and a palette

station with a CAD-CAM solution. All technologically based working steps of the turning process, such as loading, clamping, turning, control, monitoring, and waste removal run under program control. The finished pallets are withdrawn and the pallets of raw parts are fed in without interrupting the process. This is a production cell from the nils lathe system 2 - productive, economical, efficient - which guarantees operatorless production over certain time intervals.

More than two thousand users on all leading areas of industry, which are occupied with gear cutting, are performing their work on nils gear generational grinding machines.

Technical progress, quality, performance, business efficiency, and service are the foundations for fulfilling the high expectations of the customers.

A new gear generation grinding machine for cylindrical gears is the ZSTZ 06 from the main enterprise of the machine tool combine "7 October" Berlin-Weissensee. The ZSTZ 06 represents the development of a high-power gear generation grinding machine for single part, small series, and medium series production, which is mainly used in gear construction and machine construction. It is universal, productive, precise, and convenient. The new machine makes possible manifold adaptation variants to the particular processing task, rapid conversion due to a high level of automation, as well as the separate setup of the work piece and work piece support. The ZSTZ 06 is equipped with hydrostatic guides of a programmable control including extensive diagnostics.

Matched Microprocessor Control

The ZFWZ 05 CNC EZ from the VEB gear cutting machine factory MODUL Karl-Marx-Stadt is a new development of the new generation "medium construction series" and effectively cuts gears in straight and oblique spur wheels, round and tapered spur wheels, worm gears and chain wheels, as well as other profile bodies associated with gear cutting. The specially matched microprocessor control CNC H 646 has software that is specific to gear cutting machinery. Its mechanical operation under electronic control (EZ) guarantees a reduction of preparation and termination times as well as high positioning accuracy.

The combine's offering at the fair is also completed by a series of new and further developments in the area of grinding machines. Here, the trend towards the comprehensive use of microelectronics is likewise becoming apparent.

Figure Captions

1. Working area of the ZFWZ 02 - gear hobbing machine - from the VEB Gear Cutting Machine Factory MODUL Karl-Marx-Stadt
2. External cylindrical angular plunge grinding machine SASE 200 from

the VEB Mikrosa Leipzig

3. Gear generation grinding machine ZSTZ 06 from the VEB "7 October" Berlin, main enterprise of the combine
4. High power lathes for chuck and tip parts DFS 4 from the VEB Large Lathe Machine Construction "8 May" Karl-Marx-Stadt
5. The proven NILES grinding bodies from the VEB Grinding Body Union Dresden have a large group of customers
6. High-power lathe for chuck and tip parts DFS 2/2 K CNC H 645 from the VEB Machine Tool Factory "Hermann Matern" Magdeburg
7. Casting lane of the mechanical moulding shop in the VEB Casting Plant "Rudolf Harlass" Wittgensdorf

The VEB Combine Automation Systems Construction

Under the trademark VEM, the VEB Combine Automation Systems Construction exhibited at the 1984 Leipzig Spring Fair, in Hall 15, a section from its manifold export program. The offering extends from proven power electronics and process automation up to signal and safety technology, especially for rail traffic. The foreground of this Leipzig Spring Fair is occupied by an extensive offering of intangible performances such as licenses and know-how, consulting and engineering, scientific-technical results, and future-oriented solutions in working out partner contracts, user training, up to the planning and direction of complete automation systems.

Process Automation with the "Audatec" System

This complex of exhibits demonstrates the application possibilities of the well-known automation system "Audatec", which has multivalent uses. "Audatec" is a universal, microcomputer-guided automation system, which guarantees manifold applications through optimal build-up and build-down capabilities of the automation systems. In the combine's main enterprise, the VEB Electropject and Systems Construction Berlin, the information processing cabinet IVA 5020 was developed. This was designed as an application solution of the "Audatec" system for use in rolling and cement works, specifically for use in the process-proximate level in hierarchically structured automation systems. The core of the technical equipment of the IVA cabinets is the powerful memory-programmable modular system Ursatron 5000. The important advantages of this exhibit consist in a ten percent higher power utilization and in a fifty percent higher availability.

The IVA cabinet 4000 represents another product from this complex. Its main application areas are control systems for power plants, cement works, and rolling mills. The IVA cabinet is typified engineering unit, from which extensive systems can be built up for the control of engineering

processes.

Another enterprise of the VEB Combine Automation Systems Construction, the VEB High Electrical Power Systems Construction Cottbus, is specialized for the solution of automation problems in strip mining. At the fair, this enterprise is exhibiting a microcomputer-guided control stand for wide-area water retention in strip mining. The VEB Device and Control Works Teltov uses the example of an application in petroleum mining to demonstrate a system expansion and specification of the "Audatec" automation system. This variant represents an optimal adaptation of the automation system to smaller engineering processes. Thus, modified equipment for mini-automation was engineered into "Audatec" automation system. By using this variant, in conjunction with the appropriate technology, such important effects as an increase of yield and saving of natural gas are achieved in connection with petroleum mining.

Signaling Systems for Road Traffic

The VEB Device and Control Works Leipzig is making a contribution towards increasing traffic safety and towards optimizing the economy of traffic operations. At the 1984 Leipzig Spring Fair, in the complex of transport automation, it is exhibiting microcomputer-controlled traffic signals for road traffic. Well-aimed research and development work created the presuppositions for now being able to present an extensive assortment of traffic-light systems. The entire traffic-light system can be used in small, medium, and large cities. Compared to conventional central control systems, it guarantees such considerable advantages as the saving of gasoline and less cabling.

Devices for Measurement and Control Technology

The VEB Device and Control Works Teltov is an experienced producer of devices for measurement and control technology. From here come the newly developed absolute pressure transducers and the semiconductor pressure converters as well as difference measurement convertors. These devices work according to the integrated piezo-resistor action principle and have a semiconductor sensor as their decisive functional element.

Machine Automation

The VEB Numerik "Karl Marx" is a specialized operation of the combine for microelectronic controls. At the Spring Fair, in the complex of production automation, it exhibits an extensive program of numerical controls.

The CNC 646-1, presented in Hall 15, is a high-power two-computer control with manual input, based on a microcomputer system. The CNC 646-1 can be used on universal and single-purpose machine tools for broad application in model construction sites and in mass production.

The IRS 640 represents an industrial robot control which was designed for

articulated robots with electric drives. The IRS 650 makes it possible to control six position-regulated axes at the same time or also individually. This control is suitable for handling technology and for technological problem solutions. The use of microprocessor computer technology for control and regulation tasks is the basis for the IRS 650 being adaptable to the process.

The PC 600 and the variant PC 601 is being presented as a proven memory-programmable control system. Its application range comprises machine tools, especially special machinery, intermittent lanes, and large-part processing machinery, plastic processing and polygraphic machines, casting installations, assembly machines, presses, and chemical processes.

The control system is distinguished, among other features, by optimal adaptation, great reliability against interference, and high service convenience.

Novel Developments from Power Electronics

The main enterprise of the VEB Combine Automation System Construction, the VEB Electroproject and Systems Construction Berlin, has for years produced well-known and proven power electronics. At the 1984 Leipzig Spring Fair, in Hall 15, in the complex of process automation, this enterprise is presenting the DDU 380/38 thyristor converter. This thyristor converter for rpm-controlled three-phase current drives was developed for use in connection with pumps and compressors as well as for textile machine operations. The thyristor converters belong to the proven THYRESCH construction series and represent the most recent state of the art as regards the use of modern components in power and information electronics. Compared to previous thristor converters, the user enjoys an energy saving up to 30 percent.

Another exhibit from the group of power electronics is being presented with a rectifier cabinet for feeding the armature of rpm-controlled DC drives. This cabinet is a design form of the TRANSRESCH system for a rated DC power up to 100 kW. The rectifier cabinets are primarily used for dynamically high grade drives in rolling mills. Through simple application work, it can also be adapted to all other engineering processes and can be used for processing and refining machinery.

A rectifier unit for the solution of propulsion problems in the rated power range up to 6 kW, involving industrial robots as well as machine tools and textile machinery, is being offered with the TDR 100. Engineering solutions are realized with the rectifier unit TDR 100 both in the bearing control circuits of numerical control systems as well as in rpm-control, in conjunction with PC controls, through the use of an internal design-value voltage.

Axle Counting Equipment for Automatic Track Available Message

The VEB Works for Signaling and Safety Engineering in Berlin is sole manufacturer of railroad signaling systems in the GDR and is the general supplier for railroad-specific signaling, telecommunications, and electrical power technology. This enterprise of the VEB Combine Automation Systems Construction is presenting the electronic axle counting system AZ 1 MR 83. Axle counting systems are used for automatically reporting track availability in systems of railroad engineering. They are used where the use of track current circuits is not possible or reasonable for engineering or economic reasons. The axle counting system is used to report the availability of track sections, terminal track sections, switching sections, crossing sections, as well as for searching an intermediate section in humpyard interlocking towers. The design structure as well as the connection parameters permit use of the system in signaling tower systems of arbitrary design. The essential characteristic of the AZ 1 MR 83 consists in the use of modern microelectronic components including a microcomputer.

The development of the "axle counting equipment" took place, under coordination with CEMA, under the management of the VEB Plant for Signal and Safety Engineering in Berlin. The cooperating partner, especially for the external system, is ZWUS Company in Katowice, in the Polish Peoples Republic. The Federal Railways of the USSR, the HPR, and the CSSR collaborated in this project.

Figure Captions

Process automation with "Audatec"

Microcomputer controlled traffic signaling systems

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GERMAN DEMOCRATIC REPUBLIC

EXPANSION OF COMPUTER ENGINEERING CENTER PREDICTED

East Berlin SPECTRUM in German Vol 15 No 5, 1984 pp II-III

[Interview with Prof Dr. Gerd Stiller, Director, GDR Academy of Sciences Computer Engineering Center, by Utz Hoffmann; date and place not specified]

[Text] In February, the Center for Computer Technology of the Academy (ZfR) in Dresden organized the INFO '84, probably the most important scientific conference on computer science in our country. Would you like to summarize it briefly here?

Prof. Stiller. The INFO '84 offered very good conditions for specialists from the GDR and their cooperating partners from the Socialist countries presenting the results of their research in the areas of computer science and reporting their experiences and developmental trends including applications. We can be satisfied with the results. In the opinion of the participants and guests, the INFO '84 was a success.

Of special interest were the introductory conference papers of the representative of the Minister for Science and Technology, Comrade Zillmann, of the First Vice President of the AdW (Academy of Sciences) O.M. Hofmann, and of the representative of the Minister for Higher and Technical Education, Comrade Groschupf. In agreement with international trends, they noted the growing importance of computer science for the GDR, and worked out the basic requirements and orientations of society as regards research and application for computer technology.

The spectrum of lectures extended from mathematical problems to the social effects of computer science. Here, the level of the papers predominantly corresponded to international criteria.

The results achieved as well as the necessary limitation of the number of participants to 1100 indicate that there certainly exists in the GDR (in industry and in other areas of the economy, in higher and in technical education, as well as in the Academy of Sciences) a need for a scientific meeting of this type on the subject of information processing and information technology.

Three years have passed since the last INFO in Neubrandenburg. What progress can be delineated in the disciplinary development? Where do you see the most important trends for the application of modern information techniques in the national economy?

Prof. Stiller. It is known that microminiaturization of computer circuits and the further development of means for entering, storing, and representing data created the technical and economic conditions for the use of programmable computers in practically all areas of the economy (The term "computer" here stands somewhat loosely for a collective term which includes programmable electronic data processing systems, process computers, processors for special applications . . .). They are generally used to make routine mental work more efficient and to automate it, especially organization and control tasks which, in the first phase of the technical revolution, were performed by people.

Among the most important more recent trends in the economy, I consider the use of computers for data communication and communications technology, in technical design and in the organization of production, in the automation of operations in offices and management--not least of all--in education. One here observes increasingly an adaptation to the perceptive and communicative capabilities of the human person, as far as the simulation of certain analyzable cognitive processes (acoustic communication, the processing of visual displays, elements of "artificial intelligence").

The programmable computer is rapidly entering, as a working means, all areas of human activity. The performance capability of a society during the coming decades will increasingly be determined by how it uses and develops this means.

By its choice of topic with the first scientific conference at the occasion of the Leibiz meeting, the Academy also underscored its share of responsibility for computer science. Are there not at the present time some ambiguities in the interpretation of this term?

Prof. Stiller. I share your opinion that, by means of this conference, which was dedicated to questions of computer science, the Academy wanted to underscore the social relevance of this discipline. In fact, at the present time the interpretation of the term computer science is being transformed both here and in other Socialist countries, more or less in the sense of a supervening concept for "information processing" and "information technology."

What conclusions has the Center for Computer Technology drawn for its future work, from the developments of the last decade?

Prof. Stiller. In the future, we wish to activate more intensely our contribution to the disciplinary development of computer science. Steps have therefore been taken to increase the efficiency of research. Already this year, this will be expressed by the further development of the computer center into the Institute for Computer Science and Computer Technology. The institute

designation shows that we undertake not only research in computer science but also the tasks of "EDP production", as a territorial, powerful computer center of the AdW.

The future development of the Institute naturally must build on what already exists. To this extent, research on data communication and computer network technology, which has strongly stamped the previous profile of the Computer Center, will continue to play an important role in the future. Furthermore, certain generalized solutions for computer-supported design are contained in the task profile. Investigations on the architecture of computer systems as well as on programming languages and their implementation, including the operating system functions required for this, will be built up new. Previous researches in the area of data and program structures will be more clearly defined. This also holds for special studies on numerical process engineering. In general, we must take care of a suitable theoretical foundation for research altogether.

We are involved in further developing our collaboration with partner institutions of the AdW, industry, and higher education. The like holds for international cooperation, especially within the Socialist countries.

What status has the Delta computer network reached at the present time, and how do you estimate its perspectives?

Prof. Stiller. The network combines four computer centers of the AdW and of the MHF (Ministry for Higher and Technical Education), and is utilized productively. But that is only one aspect. I regard as especially significant that, in such a first step, important experience will be collected for continuing the researches at a higher level. In the next stage, we will set ourselves new tasks. The corresponding preparations are in full swing. The Delta network will be included in this work in a defined way.

The potential utility of such associated systems for the national economy is obvious. What solutions and progress are foreseeable here?

Prof. Stiller. Previously, the load linkage of computer systems stood in the foreground, but now functional tasks (data linkage) are primarily involved. For example, one might think of information systems, teletext processes, remote job processing. But here too, appropriate, economically substantiated utilization must be carefully considered, that means a suitable division between centralized and decentralized processing of tasks.

In the introduction you also mentioned your researches on the coupling of the computer and the video screen. To the human person, with a strong visual disposition, this opens up completely new working conditions and working possibilities. Do model work stations already exist for this technology of tomorrow?

Prof. Stiller. Yes, there are such work stations in very different designs for different applications. The spectrum here is extraordinarily broad. For

example, we have one solution which allows the graphic presentation of objects that can be described by a data structure, and modification of these in the conversational mode (interactively). This display means must and can be used in appropriately problem-oriented fashion, for instance to display technical objects and circumstances. Such as application, for example, is the display of molecular structures.

Could you explain to us the necessary working steps for producing this specialized program technique, so that we can better understand the effort and difficulties that are associated therewith?

Prof. Stiller. The molecule with its atoms and valences can be understood as a graph (that means as a data structure) and can thus be stored in the computer. After geometric imaging parameters have been fixed, an image of the molecule can be generated on the screen by using this data structure.

If, for instance as the result of a chemical reaction, this molecule changes its structure, this change can be communicated to the computer. This changes the internal image (data structure) and naturally also the image on the video screen. Such manipulations are possible in the conversational mode. The system can now be arbitrarily enriched with "intelligence" and "technical knowledge". Thus, for example, it would be conceivable to model reactions in such a way that the chemical process becomes functionally visible. Other familiar applications concern design tasks in building construction and machine construction, where the procedure is in principle analogous.

Now research also has specific requirements for computer science. What contributions toward the intensification of science can be delineated at this time?

Prof. Stiller. The most obvious example is the development of the computer itself. High-power computers are being used, to calculate the circuits for still higher-power computers and to prepare them for production. This is a self-reinforcing "autocatalytic" effect. The like also holds for computer-supported program development. Research planning and accounting are subject to the capabilities offered by office automation. The scientist himself would like to have available computer-supported information storage. The automation of scientific experiments should also be mentioned. As regards their requirements for computer engineering, they resemble the tasks of industrial process control including the use of robots (for example in loaded rooms).

Naturally, the main point is to utilize effectively also the "conventional" means for intensifying research, which influence, for example, the motivation, the deployment, and the working style of the researchers.

Figure Caption

Prof. Dr. rer. nat. habil. Gerd Stiller, studied physics 1951-1957; was promoted in 1959 to special questions in the investigation of time fluctuations

of cosmic ultraradiation. Beginning in 1962, active in nuclear research (investigation of reactions in light atomic nuclei); in 1969 habilitation on this topic; since 1965 concerned with questions of computer deployment in nuclear research. Distinguished with the Order of Patriotic Service in 1969. Appointed to ordinary professor at Dresden Technical University in 1970 (interdisciplinary area physics/information processing). From 1971-1978, representative of a director for research at the information processing section; from 1977 to 1983 head of the scientific area of programming technology of this section. Beginning 1 September 1983, Director of the Computer Center of the AdW.

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GERMAN DEMOCRATIC REPUBLIC

ELECTRON MICROSCOPE FOR SILICON TESTING

East Berlin NEUES DEUTSCHLAND in German 25 May 84 p 14

[Text] With the very high voltage electron microscope (below), the Institute for Solid State Physics and Electromicroscopy in Halle has available a powerful major research device by means of which many scientific problems can be dealt with. Electron microscopic investigations frequently require quite complicated preliminary work on the objects being irradiated. Our picture shows the chemical laboratory assistance Wilma Gobel involved in the preparation of silicon samples with a wire saw for subsequent thinning down by an ion beam.



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ESR, MSR PERIPHERALS MADE COMPATIBLE

Budapest SZAMITASTECHNIKA in Hungarian May 84 p 4

/Excerpt/ MSR developmental work began in 1974, later than on the ESR. And as a result of the peculiarities of the MSR system--primarily the applications areas--its own assortment of peripherals appeared.

Taking into consideration this fact as well as the first developmental experiences, joint scientific research work preceded concrete development when developing the next computer families and the peripherals for them. Some parts of this work--the element base, basic design, design automation--were entirely common. The experimental design work representing the second phase of development--following the research work--was still common, but differences appeared already in regard to the products intended for the different systems. When manufacture began, those manufacturing peripherals to complete the systems manufactured model oriented peripherals, while the OEM peripheral manufacturers cut the interface at the mechanical level.

The situation outlined above led to the point that by the beginning of the 1980's more than 300 peripheral types--external storage subsystems, input-output equipment, data preparation equipment, remote processing devices--had been developed in the two systems. This offered users ample choice, but since only the peripherals delivered in the system could be obtained more easily at time of purchase fitting in peripherals purchased separately continued to be a problem. The users purchased smaller MSR machines to perform decentralized preliminary tasks around a larger model--generally an ESR machine. In such cases the lack of exchange standards for information carriers, write modes and coding systems appeared even more sharply.

A solution to the problems mentioned was sought often at various levels, the most significant of which was a resolution of the Computer Technology Inter-government committee passed in 1981. On the basis of this a new working group was formed, with the priority task of making uniform the peripherals used in the ESR and MSR systems.

Every country developing ESR and MSR equipment took part in the work of the section thus created. The coordination of the work of those developing peripherals must be directed primarily at maximal standardization of the peripherals developed within the framework of ESR and MSR, including a catalog of technical devices, parts used, standardization of design technology solutions and ensuring exchange

standardization for equipment of the same type. Uniform peripherals would mean manufacture of larger--and more economical--series for manufacturers, simpler marketing, significant savings in developmental work and a more rational definition of the prospects for ESR and MSR peripheral development. The relative cheapness--in the event of large series manufacture--and the possibility of broad use of applications programs would mean a direct advantage for users and a reduction in the amount of operating knowledge needed, simplification of service (fewer models) and the possibility of task oriented completion of systems would represent an indirect advantage for them.

The working group dealing with peripherals has developed a complex program for the solution of the above problems which extends to the following areas:

System Logic Compatibility

--code compatibility;

--interface compatibility; and

--developing uniform technical requirements for:

punch tape input-output and data preparation equipment,
punch card input-output and data preparation equipment,
alphanumeric and graphic screens,
keyboards,
printers,
floppy disk storage,
fixed head and moving head disk storage,
magnetic tape (cassette, cartridge) storage
graphic information input-output equipment,
magnetic carrier data preparation equipment, and
terminals and subscriber substations.

System Design Compatibility

--proposals pertaining to receiver and interface sizes for the mechanics to be built in; and

--technical norm materials to be developed within the framework of CEMA.

As a result of its work in the above areas the working group is compiling proposals, uniform requirements by equipment group and technical norm documents on the basis of recommendations by peripheral developers, taking into consideration the future prospects for system development and program support--operating systems. It is to be hoped that in the course of the development of the next computer families the ESR and MSR peripherals will be developed more uniformly.

8984

CSO: 2502/59

LICENSE TO PRODUCE, ADAPT TMT 120 PRINTER

Budapest SZAMITASTECHNIKA in Hungarian May 84 p 4

/Article by Attila Kovacs: "Successful License Adaptation; the TMT 12X Printer Family"

/Excerpt The Telephone Factory carried out a successful license purchasing action recently. Within this framework, it will manufacture and sell matrix printers on the basis of a license for the MT 12X, a family of matrix printers which can be called modern in every respect, developed by the Mannesmann-Tally firm, which is well known on the world market. This will contribute greatly to reducing the shortage of printers here.

Four basic types can be found in the printer family, using microprocessor technology, with two versions, the so-called I and L versions, within each type. The latter makes possible finer resolution, almost letter quality. At present the TMT 120I and TMT 120L versions of the basic TMT 120 model are being made in the factory. The character matrix in both can be 9 by 7 points, and can be 18 by 40 points for the L version. The variable functions must be set by a program. One can achieve a speed of 160 characters per second with the I version of the printer and 40 characters per second with the L version (using the 18 by 40 character matrix with the latter). The character separation can be varied and depending on this the number of print positions can be 80, 100, 132 or 160. The printers have the standard Hungarian accented lower and upper case letters and are capable of displaying an additional seven national character sets. At present two interface cards are available: a 36 point parallel and a CCITT V.24 (RS 232 protocol) serial interface unit. Later it will be possible to use a 50 point, IEEE 488 parallel, or serial loop interface.

The small, light weight device, with a pleasing appearance, requires little maintenance and it consumes little power. Its ink ribbon cassette, easily exchanged, is sufficient for the printing of about 2 million characters. Production of the aluminum casting to be found in the printer, parts manufacture, assembly of the printed circuit cards and testing all take place here at home. In the near future they plan a further reduction in the relatively low capitalist import component, including, for example, manufacture of the printer head and the ink ribbon cassette.

The price of the devices, depending on the version, is 57,000 to 62,000 forints. In regard to external dimensions the well-known Consul 2111 printer is a good bit

larger than the TMT 120, its price is about 25-30 percent higher, the writing picture and format cannot be programmed, the character set cannot be changed, the interface cannot be exchanged and its power consumption is many times that of the TMT 120.

The Telephone Factory sold 700 of the TMT 120's in 1983 and another 300 at the beginning of 1984. The plans call for sale of 2,000 printers in the second half of this year and doubling the number of units in 1985.

We heard all this with gratifying feelings at the program organized in the middle of March by the Telecommunications Department of the Signal Technology Scientific Association.

8984

CS0: 2502/59

HUNGARIAN-SOVIET MACHINE TOOL COOPERATION URGED

Budapest FIGYELO in Hungarian 28 Jun 84 p 19

[Text] "We are interested in drawing Hungarian industry into the production development program of the Soviet machine-building industry," said Boris Balmont, minister of machine tool production and machine tool industry, last week at a Budapest presentation.

Related to this idea, the Soviet specialist mentioned flexible processing centers as the primary area of cooperation. These centers can result in changes in quality within the metalworking industry. They are planning on greatly expanding the mass production of the computer-controlled machine tool, which changes tools automatically to meet changing needs. The system includes an assembly line, as well as a modern storehouse. The production increase is planned for coming years in order to meet growing domestic needs as well as to enable the Soviets to export more. The next mutual interest is the manufacture of industrial robots. He reminded us that experts from both countries have succeeded in establishing a good relationship for a long time. He found it practical to expand cooperation in the field of semimanufactured goods and components, adding that "Those should be made mainly according to Soviet specifications and technical requirements."

Machine tool and spare parts trade in both directions increased by a factor of 2.4 between 1975 and 1983. The value of exports and imports exceeded 21 million rubles last year. Despite the rapid expansion of trade, the minister did not find links between individual enterprises satisfactory. Among the negative consequences of such trade is the fact that the partners are not familiar with each other's products, shipping schedules, and cannot solve problems quickly. He found it imperative to organize the direct relationships of authorities, ministries, enterprises and to coordinate principles of relationships.

Discussing the 1986-90 plan coordination proceedings, he mentioned that it is the mission of the ministries to prepare the plans agreed upon at high levels, and to work out the details for specialization of production and cooperation to promote their execution, as well as coordinate the specifications of the mutually delivered machinery. In the next 5-year plan, Hungarian machinery exports to the Soviet Union could increase by 25 percent. Within this, the exports of machine tools could triple compared to the current period. Related

to this, he mentioned that the firms making investments and retooling are first of all interested in tools which have the quality and technical characteristics of machine tools which used to be imported from capitalist firms. Soviet machine and equipment exports to Hungary, according to the minister, can be expanded in the second half of the decade to 20 percent above 1981-85 levels. The export of Soviet machine tools will grow even faster, by 40 percent.

CSO: 2502/72

DEVELOPMENT OF MICROPROCESSOR EQUIPMENT DESCRIBED

Accessible Microprocessor Systems

Warsaw PROBLEMY PROJEKTOWE in Polish No 1, Jan 84 pp 26-37

[Article by Romuald Pozowski, Biprohut Enterprises, Gliwice: "Microprocessor Technology in Industrial Control. Part II: Applications"]

[Excerpt] Availability of Microprocessor Technology in Poland

Hardware Equipment

The selected microprocessors for control available in Poland (as of 1982-83) are listed in Table 2. The compilation is based on published and accessible materials, with special focus on enterprises having a productive potential and specialized assembly firms. The list does not cover individual design solutions developed by institutes. These are considered to be isolated designs, although they include a great number of interesting structures and systems.

It should be noted, however, that microprocessor technology in Poland is largely scattered among various institutions. In the hardware and software areas, unfortunately, a large degree of arbitrariness exists, and there is virtually no interchangeability that is important for the user.

Software

The costs of software for microprocessor systems are estimated at about 60 to 80 percent of the total cost of an information system's development. For that reason, the solution of design problems should be accompanied by multiple aspects of activities of producers of microprocessor systems in the software field before these are introduced into the market.

These objectives can be attained through:

--application of effective methods and

--training the prospective users in programming.

Structured modeling ensures the application of effective techniques. It is based on two phases of program development. The first phase involves the creation of a model of the object of control and the controlling programs, and the second phase is concerned with writing the programs as such.

In the first phase, a high-level language is used, thus combining the convenience of programming in high-level language with meeting the specific requirements of microprocessor systems as regards the memory utilization, program operation, speed, etc.

The program in the high-level language translated on a compatible computer produces an intermediate assembler.

The second phase is based on the assembler. In that phase, the objective is realized through:

--compilation of standard programs including arithmetic operations, data conversion, basic text operational procedures; and

--compilation of utility programs by the intermediate assembler.

The compilation of the standard programs for microprocessors can make use of the procedures developed by the manufacturer or by various information science and computer centers.

These centers have programs capable of editing, intermediate translation, and simulation of programs in such languages as Basic, Fortran, Pascal, PL/M and others.

The compatible computers are the JSEMC, Odra 1305 and others. The availability of the above translation programs suggests that no difficulties should be expected in developing the software packages in Poland.

There are also centers across the nation, such as the ZETO and the Institute of Electronic Technology in Lodz, that are engaged in training prospective users in areas concerning the application of microprocessor systems and software in various languages.

Facilities for Implementation

The development of microprocessor systems of a high degree of integration and the software systems they use advances problems in implementation and testing of application systems that had not existed before.

For design and implementation of microprocessor systems, special hardware programming tools are necessary: the so-called systems of implementation assistance. These systems, with a developed structure, serve to create hardware and software and integrate these based on a system of emulation techniques.

Table 2. Selected Microcomputers for Industrial Control Available in Poland, 1982-83

Manufacturer	Symbol	Purpose	MP of central unit	Main features
1	2	3	4	5
Scientific and Production Center of Computer Technology and Measurement, Warsaw Production: Production Enterprises of Measurement Instruments and Minicomputer Systems, Warsaw	Mera, Conc Nucon 400	Control micro-computer	8080	A special purpose microcomputer system for control of machine tools in the Nucon 400 system. It is based on three microcomputers working in DS8 system (ASEA license). Also, a general purpose microcomputer.
Computex, an Enterprise of Polonia Foreign Companies, Warsaw	CS-801	Multi-function micro-computer, two processors	2XZ-80	Modular microcomputer for various configurations and expansion of I/O systems and communication with external devices. Suitable for service of multiple terminals up to 12 units. Software adapted for industrial control applications.
ELWRO - Center of Computer Systems for Automation and Measurement, Wroclaw	ELWRO-80	Micro-processor controller	8080	Microcomputer based on the MCS 400 modular system, a modular system with developed input-output terminals and appliances for communication with external systems. Suitable for industrial control. Programming in specialized ESLOG language. More modules under development.

[cont'd]

Table 2 [cont'd]

1	2	3	4	5
EMAG Research and Production Center, Katowice	PSP	Programm- ed indus- trial control unit	8080	Modular system. A basic microcomputer with the capacity for expansion around an internal main line and further development of the system around intersystem communication lines based on system modules, interface memory and multimodules. More modules under development.
IMPOL Polonia Foreign Company Enter- prises, Warsaw	MSK1	Modular computer system	Intel 80	Modular microcomputer for various automatic applications. Capability for developing diverse configurations on the basis of Intel 80 and communication with external devices (DZM 180 KSR, tape cassette memory PK2, KFAP diskettes, keyboards, tape monitor) and static and dynamic memory up to 64 K.
	MSM1	Micro- processor or 8085 modular system	8080A or Z-80	Modular microcomputer for various applications. The capacity for developing various configurations and communication with external devices (cassette memory PK1, KFAP diskettes, keyboard, video monitor, speech synthesizer) and static and dynamic memories up to 64 K. Software in Basic.

[cont'd]

Table 2 [cont'd]

1	2	3	4	5
Mera-PIAP Industrial Institute of Measurement Auto- matics, Warsaw Production: Mera-ZAP Enter- prises of Indus- trial Automatics, Ostrow Wielko- polski	Inteldigit PI	Micro- processor controller	8080A	Modular microcomputer with broad application capacities; one or multicassette design. Application capacities with sequential asyn- chronic or synchronic transmission. RAM memory up to 4 K, 8- bit words and EPROM up to 64 K 8-bit words. Connection to external systems, industrial objects or mainframe computer. Devices for central regis- tration and processing of data, including the service of analog sig- nals (PIM-10A) and bi- nary signals (PIM-100). Additional universal microprocessor con- troller (SK-02) as a controlling unit of a remote or autono- mous system.
Mera - STER Institute of Control Sys- tems, Research and Production Center, Katowice	Mera 60 (SM-1633)	Universal LSI/11 micro- computer system	LSI/11 (K 590)	Modular microcomputer for various configura- tions and extension of input/output devices and communication with external devices. Var- ious alternatives avail- able, depending on the options.
	Mera 60-256			A modified version with improved parameters adapted for multipro- cessor operation in a computer system with

[cont'd]

Table 2 [cont'd]

1	2	3	4	5
				compatible software. Operating memory up to 256 kB. Enlarged system of instructions. 16-bit words. Increased operation speed (500,000 operations/second). Compatible with PDP 11/23.
	Mera 80	Sequen- tial program controller	8080	Modular microcomputer for various configurations of industrial applications and development of input/output device networks and communication with external systems. Depending on the options, different configurations are available.
Mera-ZSA Enterprises of Automatic Sys- tems, Poznan	Micro 80	Micro- processor controller	8080	Modular minicomputer for various configurations in industrial applications and development of input/output networks and communication with external devices. Variants of modules for interfacing with the object and object-attached converters available.
Industrial Elec- tronics Institute, Research & Produc- tion Semiconductor Center, Warsaw	Mikroster	Modular system of mi- cropro- cessor controllers	8080	Modular system for development of software controllers and design of auxiliary systems. Involves basic software packages, specialized programs and

Table 2 [cont'd]

1	2	3	4	5
				<p>software for interfacing with the object (two-state input/output devices with galvanic separation of 24 V and control of D/C motor, A/C motor, A/C, C/A converters, etc.). Programming: Monitor, Assembler, Text, Editor. Control system Micros.</p>

Table 3. Selected Microcomputer Auxiliary Systems Available in Poland (1982-83)

Manufacturer	Symbol	Purpose	MP of central unit	Main features
1	2	3	4	5
Computex Polonia Foreign Company Enterprise, Warsaw	Cs-80	Micro-processor implementation system	Z-80 or Z-80A	General purpose microcomputer and implementation-measurement system with modular design. EPROM memory up to 32 kB and RAM memory up to 32 kB, with 24 input/output devices; 2 interruption levels. Sequential transmission channels to 48 input/output devices. Possibility of emulation of the emulator function. The controller of the video monitor, floppy discs and magnetic discs. Controller micro-assembler debugger, Control-Basic arithmetic program.
Mera - Elzab Computer System Enterprises, Zabrze	RTDS-8	Auxiliary system, implementation of microcomputer system	8085	Auxiliary microcomputer system with modular design. EPOM memory up to 7 kB and RAM memory up to 16 kB. Universal emulator. Controller of video monitor, floppy discs, dot printer, reader and paper tape punch and compatible computer system for general software. Adapted to Intel 8080, 8048 and 8085. Control program, interpreters

[cont'd]

Table 3 [cont'd]

1	2	3	4	5
				of Basic and Forth languages. Emulation programs EM 80 and EM 85 and programmer loading.
Mera - Ster Institute of Control Systems, Research & Industrial Center, Katowice	Mera-80	Implement- 8080 ation assembly		Modular system. Functional modules with input/output devices, RAM and ROM memories with total capacity of up to 64 kB and memory programmer. Screen monitor, remote printer, reader, paper tape punch and floppy disk. Software: MPC, Bosman, Monitor, Macroassembler, Basic and other options. Adapts to Intel 8080 (K 580).
Institute of Mathematical Machines, Warsaw	MSWP	Computer 8080 assistant design micro- processors		Modular system. Functional modules with input/output devices, RAM 64 kB memory, ROM 8 kB memory, permanent memory simulator, memory programmer and system emulator. Screen monitor, remote printer, reader and paper tape punch and floppy disk. Software: OS-I (CP/M) or OS-II (ISIS-II), Monitor, Macroassembler, Basic, EM80 and other options. Adapts to Intel 8080 (K 580) and Intel 3000 (K 589).

Mostly, these involve the following elements:

- a microcomputer with RAM and EPROM memories;
- a developed input-output system;
- a large floppy disc or magnetic disc memory; and
- system emulator.

The system emulation consists in simulating the operation of the microprocessor in the actual operational condition, which is performed by a device that comprises a similar microprocessor and logical element that allow its control and supervision.

During the course of system implementation the microprocessor is replaced by the emulator system testing unit.

In Poland (as of 1982-83), these problems have been in the focus of attention at many institutions. Selected microprocessor assistance systems available in Poland are listed in Table 3. The table is based on published and other accessible materials, with special attention to enterprises that have production potential and specialized assembly firms.

Designing of Microprocessor Systems

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish No 4, Apr 84 pp 99-101

[Article by Romuald Barlog, Engineer of Unitra-Cemi Enterprises for Electronic Component Assembly, Szczytnia: "Domestic Equipment Assisting Design of Microprocessor Control Systems"]

[Text] A review of selected aspects of the domestic situation in the development of tools assisting the design of microprocessor systems mainly used for control purposes, with comments on the major models available in Poland.

Microprocessor is a word with which many people, not all of them engineers, associate bright hopes. When the first variety of this group of integrated circuits widespread in the world was introduced in Poland, it signalled a major, although first, step to what is sometimes described as the "microprocessor revolution." We are now in the process of making the second step --broadening the range of available subassemblies and developing a base for more applications. We have still a long way to go in the "revolution." In practice, many design engineers are just unfamiliar or superficially familiar with the new technology. Polish publications are scarce and mostly of limited use in the practice of engineering work. One has to wait for industrial catalogs so long that by the time they arrive they are obsolete. Specialists have to rely on data accumulated by certain centers during the time of easy access

to information from Western firms or on catalogs obtained through "private" channels.

In this situation, it is little wonder that in a questionnaire requesting evaluation of the Mikroster system the engineer from a major factory responded that he would be able to evaluate it after he received catalog data on the basic systems. As a result, many producers of equipment for home microprocessor control would give a chance for maintaining a proper technological level are beginning to look for ways of developing their own microprocessor systems from scratch.

A Universal System or Individual Developments?

A bridge between "unequipped" LSI systems and operational microprocessor systems is provided primarily by modular microprocessor systems and at a certain stage by systems for design assistance (microprocessor development system [MDS]). The advantages of modular systems come not only from the fact that they relieve the user of the need for mastering profoundly the systems and programming techniques. In Poland's situation, an important merit is the chance of avoiding the need for overcoming the implementation problems--for instance, purchasing components is so difficult that even developing a system known from available Western documentation may take up to two years. Unfortunately, those who make the decisions as to whether a system should be purchased or built from scratch are not always aware of these limitations.

A simple evaluation of the costs based on the difference between the price of a general-purpose and often too powerful modular system and the cost of producing a specialized system is often misleading. Regrettably, however, such evaluations are often the basis for decisions. Often, the decision-makers fail to take into account such costs as the purchase of hundreds of components instead of a few modules, the cost of labor of a group of designers during several months, purchase of instruments for component testing, equipment for quality control, service development, etc. Such tools as MDS reduce these costs but slightly. A decision to build one's own system, unless it is intended for large-scale production, could be made when general-purpose systems were unavailable. This argument is beginning to lose credence.

Shortfalls in Standardization

Approximately since 1978, plans have been drawn up in Poland to develop microprocessor modular systems and MDS. Already in 1980, individual assemblies could be purchased from several sources. Lack of information, unfortunately, prevails in this area. Not only customers, but producers as well, suffer from this. More than a dozen centers have been working on a project without communicating among themselves. As a result, we have several full-fledged systems and more than a dozen fragmentary developments.

It is already clear that huge amounts of funds and labor of designer groups have been wasted. No one thought at the time of adopting national standards for mechanisms and system compatibility, so that today products of different manufacturers cannot be linked for interconnection. Attempts at introducing standards currently have a slim chance of success. Enterprises have invested too much in the development of products and will not be willing to incur additional costs involved in adapting their products to standard specifications. The biggest losers would be customers, who would have to wait additionally until the modernized products are brought into operation and would have to bear the costs of the changeover. More likely, standardization will be obtained eventually by way of natural market elimination of most systems. A fundamental shortcoming of this solution is the incompatibility with modules of Western manufacture. Yet the chances for export in this system category (single processor 8-bit systems) are so small that this is not a significant argument for producers. Customers are mostly concerned with speedy delivery, and those who can afford to import Western modules are too few to further delay production for their sake. It is necessary, however, immediately to adopt standards for 16-bit multiprocessor systems capable of operating in remote communication networks. These systems are beginning to appear, and we should not permit another waste of effort and resources.

Available Polish Products

More than a dozen large and small microprocessor systems are currently offered in Poland. Among the most interesting systems one should mention: RTDS-8, MSWP, Elwro-80, MSM, Moproca and Mikroster, and also the Mera-60, Camac and Inteldigit-PI. The first two are typical MDS systems, and the last two are well-known systems that were created before the advent of microprocessors and have now been expanded with packages of microprocessor controllers; as to the Mera-60, it steps beyond the scope of the category discussed here.

Due to information deficits, most users are unfamiliar with the capabilities of these systems and especially are unaware of the practical differences of their use. Information on types of modules, memory capacity and software can be ordered from manufacturers in the form of better or worse prepared information cards. For that reason, we give here only brief outlines, concentrating on the practice of operating these systems and general comments concerning selected models.

MDS Systems

The RTDS-8 system [1, 2, 3], offered by Mera-Elzab Computer Equipment Enterprises, and the MSWP system [4, 5], developed by the Institute of Mathematical Machines, are typical design assistance systems corresponding to the average world level; their operation is based on system emulation--that is, on simulation of the work of a processor in a system controlled by a system with microprocessor surrounded by devices that allow monitoring and controlling its operation.

In practice, at the site where the microprocessor will eventually be placed, the emulator probe is mounted. In this way, it is not necessary to use in the utility configuration the special devices that will only be needed in the implementation phase. A general outline of the design strategy for microprocessor systems [5, 6] can be represented by a block diagram (see the figure). MDS systems are used for assistance of design only at the stage of encoding, translating and testing the programs and integrating the programs with the hardware. For implementing these functions, the RTDS-8 and MSWP systems offer similar capabilities. They use as system processor the 8080 (MSWP) and the 8085 (RTDS-8). They have the same peripheral devices: CRT monitor and keyboard, paper tape printer and reader, floppy disk memory (MSWP, two units) and programmers of basic memory types EPROM and PROM. The products have two standard operating systems: CP/M and ISIS II. The basic software includes: 8080 assemblers and macroassemblers (RTDS also 8085) and translators of Basic and PL/M languages (RTDS also Forth and Fortran languages). The emulation capabilities are different; for the RTDS-8, 8080, 8085, Z80 and 8048; and for the MSWP, 8080 and 3000. There are also differences in some other features, but the eventual survival will be decided by the price. Currently, the RTDS-8 costs about half as much as the other system.

Modular Systems

These systems do not require the user to come up with design solutions from scratch. They offer a certain modular configuration that implements a series of utility functions and is furnished with the means to allow development of applications software, which is integrated with the hardware largely automatically. The design work on hardware has to be done by the user only when the modular configuration does not implement the special function that he needs. The software design is also simplified through a series of standard programs implementing the functions of control measurement, data processing, etc.

Polish producers currently offer more than a dozen various systems. Some data on the capabilities of the more widespread configurations are given in the table. Since it is impossible to provide all parameters in a table, or to describe them fully, it seems appropriate to offer at least a brief description of the individual systems.

The Elwro-80 [7, 8], manufactured by Elwro Enterprises, is intended for sequential control. To this end, a simple programming language, ELOG-80 [8], has been developed, and a special device for controller programming in this language has also been developed. This device also functions as a prototype technical keyboard. Thanks to the simple service, the concept is interesting. The limitation of the number of inputs and outputs to 128, however, causes some doubt.

Since the 8080 processor requires a fairly developed hardware equipment, cost per one input or output will be relatively high. Serious competition to the Elwro-80 will be offered by the sequential controller LP IANiUP [10],

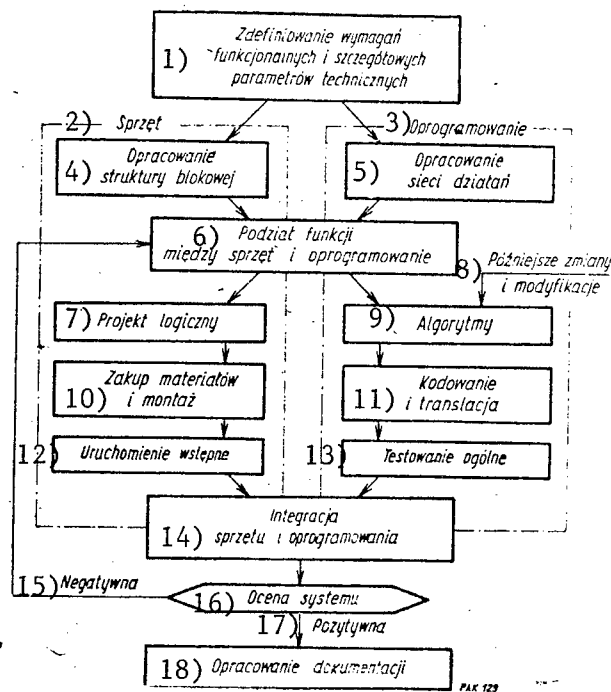


Figure 1. Algorithm of development of the microprocessor-based systems of control

Key:

1. Definition of functional and detailed technical parameters
2. Hardware
3. Software
4. Development of the block structure
5. Development of the functional network
6. Division of functions between the hardware and software
7. Logic design
8. Later changes and modifications
9. Algorithms
10. Purchase of components and assembly
11. Encoding and translation
12. Initial runs
13. General testing
14. Integration of hardware and software
15. Negative
16. System evaluation
17. Positive
18. Development of documentation

Table 1. Selected Parameters of Polish Modular Systems

	<u>Elwro- 80</u>	<u>Mikro- 80</u>	<u>MSM</u>	<u>Micro- Proca</u>	<u>Mikro- Ster</u>
Processor	8080	8080	8080 and Z-80	8080	8080
Devices:					
Screen monitor	+	+	+	+	+
Reader and punch	+	+	+	+	+
Printer	+	+	+	+	+
PK-1 tape memory	-	-	+	+	+
Disk memory	+	+	+	+	+
Special keyboard	+	-	-	-	-
Input/output 24 V	+	+	+	+	+
Input/output TTL	-	+	-	+	+
Standard interfaces:					
R 232	+	+	+	+	+
V 24	+	+	+	+	+
IEEE 488	-	-	-	-	+
Operating system:					
CP/M	-	-	+	-	-
ISIS II	-	-	+	+	+
Programming languages:					
Assembler	+	+	+	+	+
Basic	-	-	+	+	+
PL/M	-	-	+	+	+
Forth	-	-	+	-	-
Fortran	-	-	+	-	-
Special	ELOG	-	-	KAMIL	-
Conversion a/c and c/a	-	+	-	+	+
Control of DC drives	-	+	-	-	+
Control of discrete drives	-	-	-	-	+

manufactured by AGH in Krakow and introduced to Mera-KFAP. A simpler design solution based on mass-produced 1-bit controlled MC 14500 B allows hoping that a lower-priced unit will be available with an equally simple service and much greater capacities (up to 3072 inputs and outputs). Potential additional software capabilities of the Elwro-80 in 8080 assembler, either through a cross assembler on the Mera-60, do not offer a major attraction because it is difficult to utilize them fully with this limited system capacity. Data on other sequential controllers are scarce.

Mikro-80 [11, 12, 13] is developed by the Automatic Systems Center in Poznan. The system has already been tested in several important applications for automation of industrial processes. The configuration of modules and options is broad and encompasses almost all aspects of control of typical industrial objects. The entire system comprises about 20 packages. It has one major flaw, however--the software is underdeveloped. The manufacturer offers only monitor, editor and assembler (that is, only elementary software). This may jeopardize the future of this interesting and valuable system. An important merit, however, is the equipment allowing analog measurement at distances of up to 2 km, which has been attained in an application of the remote module of a voltage-frequency converter.

The MSM [15] is a system developed by the Informatics Institute of Warsaw Polytechnic. The system has a well-developed set of basic modules, so-called memory processes and standard input/output devices. Specialized software packages for automation are in the development stage.

An advantage of this system is its software. It is well developed both for the version without floppy disk memory and for the version with such disks. In the former case, the Demon/Mnemon monitor and Symon symbolic monitor serve to implement basic functions in developing, memorizing and implementing the utility programs at the assembler level. In the disk-version MSM, all software capabilities possessed by Western systems of this generation in the 1970's are included. The development plans encompass also enlarging the system capability through processor modules (arithmetic, graphic and communication modules). This may become, therefore, an interesting system. However, the following question needs to be asked. Will the MSM be capable of gaining the proper place in competition for customers where not only the current and future composition of modules and software but also prices, delivery schedules and production capacities are important?

Microproca [16, 17] is offered by the Polonia Company Impol 1. The system is well developed both as regards hardware and software. Among its merits is the fact that the number of modules already manufactured is large, and the activity of the firm suggests that a further increase can be expected. It is difficult, however, to project the future fates of this system in the conditions when a serial production and accessibility of competitive systems will lead to a price decline. Potential users fear that the firm will find it no longer worthwhile to continue manufacturing this system; Impol is not at this point working against these views actively enough.

Mikroster MSA-80 [9] has been developed by the Electronics Industrial Institute. It has already been described in POMIARY AUTOMATYKA KONTROLA. Work on the system has been going on since 1968. Developed on the basis of operational experiments, the version currently introduced into production at Unitra-Cemi in Szczecina is, in the light of latest data, the most developed of Polish offerings. An advantage of the Mikroster system is the scope of accompanying services. In addition to well-developed documentation, these include, among other things, the publication of a several-hundred-pages-thick catalog and organization of user-training courses. The catalog, which contains complete information on the modules, will cover all the data necessary for the user and will also give information on power sources, cassettes and other mechanical elements and the basic data on the functions of available software. The two-week user courses will include familiarization with the hardware capabilities and operational techniques with design-implementation systems. The courses will be conducted through the facilities of the Informatics Educational Center at ZETO in Lodz.

Another valuable configuration is the fact that Cemi in Szczecina is open for cooperation with all those willing to launch projects towards increasing the options in developing compatible hardware with Mikroster separate from PIE work and their own projects.

Time will tell which of the systems will come out victorious in domestic markets. Even today we can recommend to managers of centers undertaking projects in microprocessor control development to steer clear of creation of new "original" systems. Rather, they should concentrate their efforts on enlarging the existing systems, which will bring them faster and greater profits.

Decision-makers should be requested to step up standardization work for the future generation of microprocessor hardware. This will lead to major savings in development work and at the same time guarantee greater competition, which is a prerequisite to price reduction and quality improvement. Then, instead of the question, "which system should be produced?", the crucial issue will be: what specialization should be adopted to achieve the best effects in a competitive environment?

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